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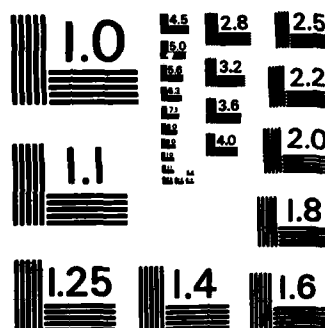
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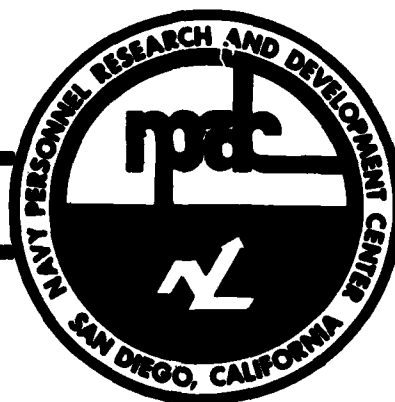MICROCOPY RESOLUTION TEST CHART

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SHIP-INITIATED MICROCOMPUTER APPLICATIONS: LESSONS LEARNED

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SHIP-INITIATED MICROCOMPUTER APPLICATIONS:
LESSONS LEARNED

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

To determine the effect of ship-initiated microcomputer applications upon general shipboard administration, a microcomputer with a data management system (DMS) and word processing system (WPS) capability was placed in two Navy combatant ships. Over 80 DMS and 200 WPS applications were developed and used by the ships. These applications were observed to facilitate control of shipboard administration and to reduce paperwork. Areas discussed include application design and development, system reliability and maintainability, system operations and utility, system personnel and logistic support, system benefits, and system costs. Lessons learned are listed.

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FOREWORD

This task was conducted in response to a reimbursable work request from the Navy Science Assistance Program office under work unit N60921-WR-W00155 (Evaluation and Documentation of Ship-initiated Microcomputer Applications). The objective of the work unit was to document and evaluate the installation and use of a microcomputer system onboard USS COONTZ (DDG 40) and USS ARTHUR W. RADFORD (DD 968). This document describes the effects of the ship-initiated microcomputer applications and lists lessons learned. NPRDC TN 82-28 provides a detailed description of the applications.

Appreciation is expressed to the men of COONTZ and ARTHUR W. RADFORD, whose cooperation and assistance aided in the preparation of this document. Also, appreciation is expressed to Commander Naval Surface Force, U.S. Atlantic Fleet for support and encouragement in the use of nontactical automated data processing equipment aboard ship.

JAMES F. KELLY, JR.
Commanding Officer

JAMES W. TWEEDDALE
Technical Director

SUMMARY

Problem and Background

The shipboard administrative function involves manual procedures that, in the shipboard environment, waste resources, increase likelihood of error, and reduce the operational efficiency of the ship.

Commander Naval Surface Force, U.S. Atlantic Fleet authorized USS COONTZ (DDG 40) and USS ARTHUR W. RADFORD (DD 968) to lease a microcomputer system containing a data management and word processing capability. The data management system (DMS) provided for the creation, maintenance, and reporting of data from user-defined data files. The word processing system (WPS) provided for the creation and production of letter-quality documents.

Objective

The objective of the work was to determine the effect of ship-initiated microcomputer applications upon general shipboard administration.

Approach

The microcomputer system documentation and DMS/WPS applications were reviewed. Interviews were conducted with shipboard personnel who used the system. Interview questions concerned application design and development, system reliability and maintainability, system operations and utility, system personnel and logistic support, system benefits, and system costs.

Ship readiness data to evaluate the possible effect of the microcomputer system upon overall ship combat readiness were not available because of security classification. However, applications intended to support day-to-day ship operations were analyzed.

Results

1. COONTZ and RADFORD, collectively, developed and used more than 80 DMS and 200 WPS applications using the installed microcomputer systems. The overall effect of these applications upon ship-internal administration and ship operations was positive. Each application met a specific shipboard management requirement and saved administrative time and labor over existing manual methods. In particular, the typing backlog in COONTZ was eliminated by distributing the WPS capability to any trained user.

2. Microcomputer user and supervisor attitudes toward the use and utility of the DMS/WPS applications were favorable. Supervisors and managers indicated that the applications enhanced administrative controls, corporate memory, computer literacy, and job satisfaction.

3. The minicomputer system was easy to install, operate, and maintain in the ship environment. It was responsive to six users and provided average automatic data processing equipment (ADPE) security. Ten megabytes of hard disk mass storage were not sufficient for the DMS/WPS applications in COONTZ.

4. Fifteen to 45 percent of the ship's company personnel support was required to operate the ADPE, develop/manage DMS/WPS applications, and train system users.

5.   Minicomputer system hardware, which used off-the-shelf commercial ADPE. was 100 percent reliable in the ship and sea environment.   No maintenance, other than minimal preventive maintenance, was required for the ADPE in either ship.

Conclusions

The use of a microcomputer system with a DMS/WPS capability for automating ship-internal administrative functions generally increased clerical productivity and operating efficiency in COONTZ and RADFORD. The introduction of a like capability in other ships would probably produce similar results.

Recommendations

1.   Encourage and fund micro- or minicomputer ship-initiated endeavors.

2.   Incorporate user-designed and command-managed DMS software packages into the software configuration for future shipboard nontactical ADP implementation pro-grams.

3.   Design shipboard WPSs to support multiple WPS terminals for use by personnel required to draft or produce both internal and external distributed documents.

CONTENTS

INTRODUCTION

Problem and Background

The shipboard administration function involves manual procedures that, in the shipboard environment, waste resources, increase likelihood of error, and reduce the operational efficiency of the ship.

In early 1980, Commander Naval Surface Force, U.S. Atlantic Fleet, authorized USS COONTZ (DDG 40) and USS ARTHUR W. RADFORD (DD 968) to lease a microcomputer-based data management system (DMS). The microcomputer system on both ships was used over a 12-month period, which included a 6-month deployment for both ships. Since computers have the potential for manipulating nontactical data and processing text aboard Navy ships, it is important to determine how these applications affected shipboard administration and operations and to identify problems and "lessons learned" for future ship computer installations.

Objective

The objective of this work was to determine the effect of ship-initiated micro-computer applications upon general shipboard administration. An earlier report provided a detailed description of these applications.[1]

APPROACH

Microcomputer System Description

Hardware and System Support Software

The microcomputer system in both COONTZ and RADFORD consisted of the following hardware:[2]

- Alpha Micro AM-1031 microprocessor system, consisting of a Western Digital 16-bit central processing unit (CPU) with 256KB MOS memory, 12 input/output ports, and a Control Data Corporation CDC-9427H disk drive unit with 5KB fixed and 5KB removable mass storage magnetic hard disks.

- Digital Equipment Corporation DECwriter III LA-120 printer-terminal with compressed printing for up to 220 column outputs.

- Qume daisy-wheel letter quality terminal-printer.

- SOROC IQ-120 video display terminals (6)

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[1] Dollard, J. A., & Bockman, R. Ship-initiated microcomputer applications: Detailed description (NPRDC Tech. Note 82-28). San Diego: Navy Personnel Research and Development Center, September 1982.

[2] The naming of commercial products does not imply Navy endorsement of those products.

1

The microprocessor system, DECwriter LA-120 terminal-printer, and SOROC video display terminal were located in the lower combat information center (CIC) in COONTZ and in the Data Bank Technical Library in RADFORD. The other SOROC video display terminals were located in the weapon's department, personnel, ship's administrative, engineering department, and supply offices aboard both ships. In COONTZ, an additional location in the upper CIC was wired to accommodate a cathode-ray tube (CRT) terminal during at-sea periods. The Qume letter-quality terminal printers were located in each ship's administrative office. All cabling between the CPU and the peripheral devices used military standard three-pair shielded cable, which was laid into each ship's existing cable ways by ship's company personnel. The entire microcomputer system was powered by 60Hz electric power. Power fluctuations were controlled by a constant voltage transformer (CVT) power supply and line filter. Each individual unit of the microcomputer system could be carried by one or two ship's personnel to any location on the ship or into another ship without difficulty.

The microprocessor system support software contained a multi-user, multitasking, and multiprogramming operating system. This software provided both COONTZ and RAD-FORD with a distributed, interactive, and time-sharing computer system for up to six users simultaneously. This was accomplished through a dedicated system monitor that assigned partitions in computer memory and then provided each partition 10-20 millisecond (msec) intervals of processing time. This allowed each user to be unaffected by the presence of other users on the system and to perceive that he was using a stand-alone microcomputer. The operating system also provided for quick system startup, user access security, use of command words and files for repetitive operations, help statements, disk-to-disk software backups, and various printer output options. The higher-level language used by the system was an extended version of BASIC that included name-length variables, memory mapping, and labeled subroutines. The operating system software, including file and commands necessary to operate the AM-1031 microprocessor, is described in detail in the manufacturer's operations and technical manuals.

Data Management System

Both COONTZ and RADFORD were provided with a data management system (DMS) called AMS, which was commercially developed by Applied Micro Systems, Ltd. AMS automatically provided for the creation, data entry, updating, and report generation from user-defined data files or data bases. The system also provided detailed documentation of file layouts and interrelationships between files. AMS was totally conversational, which meant that users could respond to questions asked by the system on the video display terminal. Each data file, report, or updating or input routine, when established, was automatically added to a series of customized menus displayed at the user's request. The AMS file management system consisted of the following three operating modules: (1) master file maintenance and generation, (2) input generator, and (3) report generator.

A significant feature of AMS was its capability to establish predetermined record pointer files for various sorts required for either retrieving records by user-oriented keys (e.g., individual's last name vice SSN) or for reporting data by desired sequences (e.g., duty section, life-raft assignment, projected rotation date, etc.). These pointer files were automatically updated by AMS whenever a user entered new records or a data element that had been flagged by the system as a sort field or part of a multiple-field sort sequence. This indexing capability is common with larger DMSs and is called indexed sequential access management (ISAM).

Another capability of AMS was its ability to allow users to define easily their own data files, to input data into single or multiple data files using a single-screen-formated

input function, and to output data, either from one or more data files, onto hard-copy reports. All this could occur without the aid of a professional programming staff simply by using the interactve features of AMS. If the user had programming experience, AMS was able to generate its own BASIC language source code based on the user's interactive inputs. These inputs could be modified by the user as necessary to facilitate ease-of-use, local unique terminology, or data entry error correction.

No formal documentation was provided for the AMS DMS software. All use of the the DMS depended upon self-teaching, trial-and-error experimentation, and on-board training by those who had gained experience with the system. COONTZ enjoyed an advantage over RADFORD in knowledge of the use of the DMS because the COONTZ commanding officer (CO) was instrumental in selecting the AMS DMS and had worked closely with the AMS vendor to learn the system.

Word Processing System

Both COONTZ and RADFORD used a commercial word processing system (WPS), called ALPHA WORD, for general correspondence preparation and printing. ALPHA WORD had the capability of creating, updating, printing, and deleting (1) lists (e.g., for mailing labels and simple sorts), (2) documents (e.g., letters and ship's instructions), and (3) standard paragraphs (e.g., those used in preparing the ship's plan-of-the-day (POD)). The Qume printer-typewriter, when used by ship's office personnel in conjunction with ALPHA WORD, produced letter quality documents easily and efficiently.

Evaluation Procedure

Pertinent microcomputer system documents were reviewed and selected personnel were interviewed during February and March 1981. The documents reviewed included DMS computer-generated documentation, DMS and WPS applications outputs, and computer equipment operations and maintenance manuals and logs.

Interviews were conducted with shipboard personnel having direct or indirect use of the microcomputer applications.

FINDINGS

System Applications

Data Management Applications

During the period between March 1980 and March 1981, COONTZ defined approximately 50 data base files and ship-generated data input functions with over 80 hard-copy output reports. These data files, input routines, and output reports collectively made up the COONTZ DMS, which is graphically outlined in Figure 1.

RADFORD did not use the system-provided DMS except in a few isolated cases. RADFORD did not possess the training, documentation, nor DMS expertise to define adequately the data bases, develop and modify the input routines, and format the output reports as required by the DMS. COONTZ, on the other hand, had the on-board expertise for such an endeavor. The COONTZ CO not only possessed DMS and programming skills but also was responsible for soliciting financial support and authority for the two acquired microcomputers placed in COONTZ and RADFORD. The resources and general command involverr ·nt to desi 1, develop, implement, maintain, and revise a DMS of the scope

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                    ┌─────────────────────┐
                    │    COONTZ DATA      │
                    │  MANAGEMENT SYSTEM  │
                    └─────────────────────┘
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| ADMINISTRATION | MAINTENANCE | PERSONNEL QUALIFICATIONS |

- GENERAL
- JOB/DUTY/WATCH ASSIGNMENT
- PLANNING/TRAINING
- SCHOOL
- PHYSICAL SECURITY
- MEDICAL
- ENLISTED DINING FACILITY

- ZONE INSPECTION
- EQUIPMENT DISCREPANCY/ CORRECTIVE MAINTENANCE
- SUPPLY

- PQS
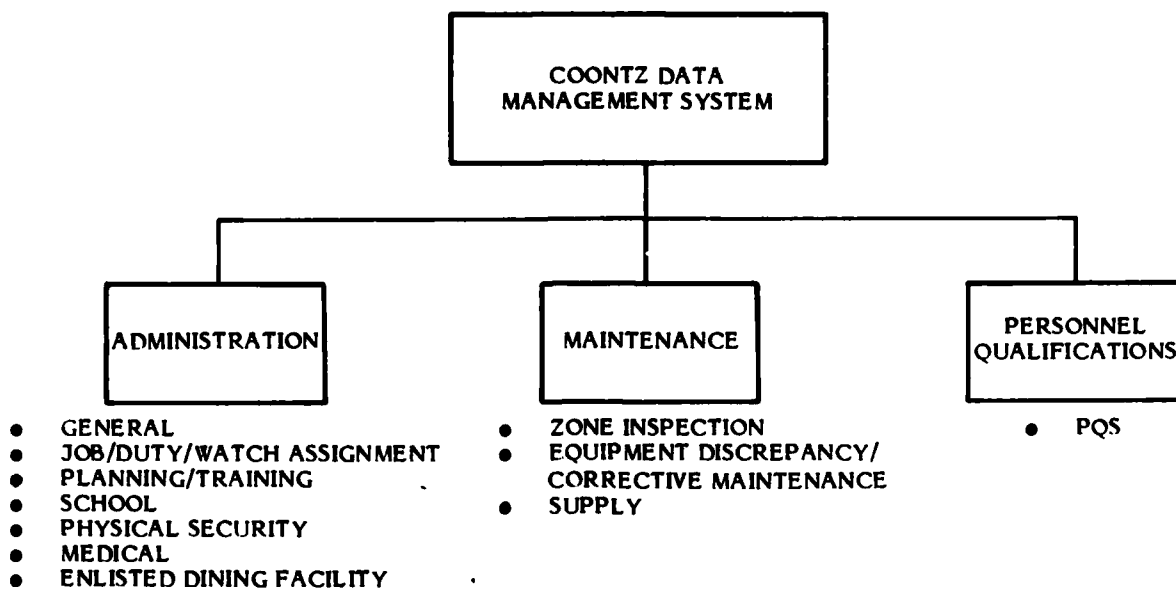
Figure 1. COONTZ data management system subsystem structure.

eventually produced aboard COONTZ could not have occurred in RADFORD without an extreme effort by the ship's managers and crew to learn and apply the DMS by trial-and-error. However, the system-provided WPS offered an alternative means of using the microcomputer for simple data management in RADFORD. Since the word processor was easy to use, was well documented, and had a simple sort capability, RADFORD was able to exploit the WPS almost as fully as did COONTZ using the more sophisticated DMS.

The applications developed by COONTZ are listed in the appendix and discussed in the following paragraphs.

1. **Data files.** Use of many data files, rather than a few large ones, allowed COONTZ to exploit the DMS's ISAM capability (described on page 2) with key fields or predefined indexed sequences of fields that could be instantaneously updated during data entry input. This ISAM feature allowed the use of more familiar secondary key(s) (e.g., last name), rather than more complicated or sensitive primary key(s) (e.g., SSN). COONTZ had no desire to use an SSN to retrieve a personnel record when an individual's last name was common knowledge. If several individuals had the same last name, the user needed only to "page" alphabetically to the record desired. Small data files also provided COONTZ with better file security by distributing data access to responsible users. This minimized possible data loss due to an equipment malfunction or human error.

2. **Input routines.** COONTZ was able to input data into the data files via either system- or ship-generated input functions. Whenever a new data file was defined, the DMS automatically generated a screen-formatted input function that could be used to enter, update, or delete all data elements for that data file. Using an alternative input

mechanism, COONTZ generated its own input functions using the DMS input generator option. This option allowed COONTZ to develop input routines that could enter, update, and delete data associated with a subset of the data from one or more data files. Since the DMS generated BASIC source code, COONTZ was able to modify the coding to incorporate ease-of-use prompts, help statements, local unique terminology, and date conversion algorithms (e.g., Julian date format).

3. Output reports. The output reports developed by COONTZ output data from one or several data files, list from 3 to 23 data elements, and produce hard-copy outputs with up to 220 columns. Similarly, COONTZ was able to modify system-generated source code in order to insert user selection queries (e.g., program queries user as to which work center to report data on), perform calculations, and format the hard-copy output for more than the traditional 80 or 132 columns.

Word Processing Applications

The WPS was used extensively aboard both COONTZ and RADFORD to prepare text documents, such as memoranda, letters, ship's instructions and notices, ship's bills, standard operating procedures, lesson plans, and naval messages. Larger and more static documents, such as ship's instruction, were stored off-line on spare disk packs that were placed on-line for retrieval, review, and updating. These updated instructions were then easily retyped and redistributed using the system printer or Qume typewriter-printer and the ship's copier machine. The WPS even had the capability to select which pages to retype to facilitate making small changes to large documents.

With a multiterminal WPS, as in COONTZ and RADFORD, word processing became an "all hands" system that allowed personnel other than ship's office personnel to access and to perform word processing. Officers, chief petty officers, and many petty officers interacted with the WPS to perform many daily routine and ship-internal correspondence tasks. For example, even the traditional pocket notebook or "wheelbook" was, in many instances, replaced by a WPS file (e.g., supply part stock number and pricing notes, work center rosters, tickler notes). Also, preformatted naval message texts (some with embedded help remarks in the fill-in-the-blanks spaces) could be easily retrieved, edited, and added by using the WPS cursor-controlled commands.

COONTZ made excellent use of the WPS standard paragraph utility for preparing the ship's plan-of-the-day (POD). For example, pertinent information (e.g., that on seasonal dress and working uniforms, duty section watch assignments, ship's daily routine, safety precautions notes, and damage control questions) was pretyped as standard paragraphs, perhaps weeks or months in advance, by cognizant personnel and then retrieved as simple coded commands by the ship's office yeoman to "build" and print the next day's POD. A sample COONTZ POD that was produced using standard paragraphs and typed by the WPS Qume typewriter-printer is shown in Figure 2.

As mentioned above, RADFORD favored the WPS over the DMS for performing selected data management functions. The WPS could perform these functions because of its limited sort (list) capability and ease by which changes could be made to existing reports. The categorical WPS application areas used by RADFORD are listed in the appendix. Note that several of the applications were similar to COONTZ's DMS applications. Applications used in RADFORD that were not attempted in COONTZ included using the WPS to produce personnel qualification standards (PQS) cards for lookout, sound-powered telephone talker, and helmsman; inspection check-off lists; master-at-arms law enforcement documents; small arms inventory and control lists; and air detachment check-off lists.

PLAN OF THE DAY
Sunday 15, February 1981
Julian Date: 046
INPORT: NORFOLK, VA

FOR OFFICIAL USE ONLY   DO NOT REMOVE FROM THE SHIP

UNIFORMS	OFFICER & CPO	ENLISTED
Working	Working Khaki Long Winter Working Blue	Dungarees/Utilities
Uniform of the Day	Service Dress Blue Winter Blue	Service Dress Blue Winter Blue
Liberty	Uniform of the Day App. Civilian Attire	Uniform of the Day App. Civilian Attire

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DUTY OFFICERS		OOD WATCHBILL		DUTY SECTION FIVE	
CDO:	LTJG COSTA	08-12:	RM1 THOMAS	DUTY MAA:	FTM1 BIBEAULT
OPS:	LT SEXTON	12-16:	LT SEXTON	DUTY YN:	SN CHANDLER
WEPS:	FTM1 EMERY	16-20:	FTM1 EMERY	DUTY RM:	RM3 JACKSON
ENG:	MM1 BARRS	20-24:	GMT1 KING	DUTY SM:	QM2 GALLO
SUP:	SK2 WILSON	00-04:	EM1 ALEMAN	DUTY DR:	RM3 JACKSON
X/N:	LTJG MILLER	04-08:	ENS HIGGENBOTHAM	SEC LDR:	DSC BARNETT

SHIP'S ROUTINE

Schedule is in accordance with the Routine of the Day as published in the SORM for
Holiday Routine inport with the following exceptions:

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0800 - MUSTER DUTY SECTION
0900 - OOD PQS
1630 - DUTY INPORT FIRE PARTY/Z-27-D
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HAPPY BIRTHDAY: NONE

ALL HANDS ARE RESPONSIBLE FOR THE CONTENTS OF THE POD

ORDERS OF THE DAY

1. STRIKER SELECTION BOARD. Membership of the Striker Selection Board shall
consist of an enlisted representative from each department, minority representation, and
shall include the master, senior, or chief petty officer of the command as chairman, and
the command Career Counselor, when assigned. The senior personnelman assigned shall
be a member (voting or non-voting) and shall provide qualification information to the
board.

2. SECURITY NOTE. Espionage. There are no current indications of activity by hostile
intelligence services in the Norfolk area. However, all COONTZ personnel should be alert
to the fact that intelligence agents would likely concentrate their attention on personnel
whose conduct (e.g., sexual promiscuity, need/greed for money, drug dealing, etc.) would
make them vulnerable to blackmail. COONTZ personnel should avoid involvement in such
compromising situations. COONTZ personnel must also promptly report to their superiors
suspicious contacts with foreigners, or any request for defense information.

DC QUESTION.   Q.   What size plug is recommended for an 8" hole?
               A.   10" plug

3M QUESTION.   Q.   If a monthly maintenance requirement was accomplished once
during a quarter, is a notation required on the back of the quarterly schedule?
               A.   Yes

D. S. Bill
CDR USN
EXECUTIVE OFFICER

System Reliability and Maintainability

During the 12-month period between March 1980 and March 1981, the microcomputer systems in COONTZ and RADFORD did not malfunction. Consequently, no downtime statistics were available. One SOROC terminal in COONTZ had a bad resistor, which was replaced by ship's force personnel. A spare parts kit was provided to both ships by the equipment leasing vendor but was never needed for repairs. Two ship's company personnel from each ship had attended a 2-week maintenance training course. However, they were not needed due to the "no failure" reliability of the equipment.

The microcomputer systems in both COONTZ and RADFORD were subjected to a full range of shipboard environmental conditions, including heavy seas, gun or missile firings, full power and backing vibrations, high temperatures (85-95°), and medium to high humidity (75-85%). No system degradation was experienced. The LA-120 terminal-printer in COONTZ experienced overheating problems that were corrected by turning the printer off when not in use. Aboard RADFORD, the microcomputer system was often turned off before or during any periods of heavy seas or loss of air conditioning as a precautionary measure. Aboard COONTZ, the system (except for the LA-120 printer) operated continuously. There was no system damage nor data loss due to power problems. System interruptions or failures were never experienced due to transient power fluxuations.

Planned maintenance for the microcomputer systems was minimal and consisted, primarily, of cleaning system parts, such as filters, disk read/write recording heads, CRT key contacts, and printers for paper debris.

System Operation and Utilization

System Startup and Shutdown

The system operator was able to start the microcomputer by energizing the power-on switches to the CPU, disk drives, and peripherals and by "booting" the system by pushing a RESET button on the CPU. Startup operation required about a minute. Shutdown procedures followed a similar sequence in reverse order but required that (1) all on-line users be notified in advance that the system was going "down" and (2) a system shutdown command be executed.

User Access, Data Input, and Report Output

Project number and programmer number (PPN) were used to organize disk storage and to establish protection boundaries. Each user was required to "log" into his assigned PPN and issue the password associated with that PPN. Use of PPN areas or accounts allowed a user to "read" and "write" data contained in his area or other areas with the same project number. For example, aboard COONTZ, PPN (100,100) was designated as a general area for maintaining and reporting data related to maintenance and supply functions and was accessible by most maintenance and supply petty officers. Access into the DMS or WPS required that the user enter a short command word (i.e., "DB" or "AW" respectively). Upon entering the DMS or WPS, the user either interacted with a list of options (menu) or entered other command words to retrieve the desired applications. Sensitive applications, such as pricing of new requisitions, required the user to enter a second password. In most applications, help statements and user-oriented prompts were available or presented to the users. Output reports, when executed by a user, were printed at the LA-120, removed and stacked by personnel working in the lower CIC, and later picked up by the requesting user.

System Backup

To preclude catastrophic loss of stored data and programs, the data from the on-line disk packs were transferred daily to off-line disk packs. The operating system was capable of copying an entire disk and verifying the copy by comparing it with the parent disk. Both COONTZ and RADFORD used this copy feature of the system to backup the disk. A disk-to-disk backup of the data and programs on file took from 2 to 3 hours. A shorter backup of critical data files was backed up daily in COONTZ and took about an hour. COONTZ would perform the full system backup at least once a week; and RADFORD, once a month. In all cases, backup operations required the system manager to take the system off-line for dedicated use until the backup was completed. The reason for this was because the only two disk drives available on the system were both required for a disk-to-disk backup.

System Proximity and Availability

User proximity to one of the six video display terminals and consistent system hardware/software reliability provided both COONTZ and RADFORD with quick and direct access to the DMS/WPS application programs and data files. This terminal proximity and system availability were considered excellent when only the six terminals were in demand. When additional terminals were required, as during periods of peak system load, some users became impatient and frustrated while waiting for their turn to get "on-line."

System Utilization and Ease of Use

Aboard COONTZ, an average of four users were on the system from 0800 to 2000 daily entering and retrieving data. Based on user interviews, approximately 30 percent of the personnel assigned to COONTZ interacted directly on-line with the microcomputer with 50 percent of the crew depending on the system's hard-copy outputs. Aboard RADFORD, 15 percent of the crew interacted with the microcomputer with nearly 50 percent using the outputs. Aboard COONTZ, more than 80 DMS administrative and data system reports were outputted and distributed (see appendix). RADFORD, which depended more upon the WPS than the DMS, produced almost 200 word processing output types for their general administration and clerical purposes. Both ships developed great dependency upon the microcomputer system capabilities as a data file manager and word processor. Removal of the system from either ship was deemed (at least emotionally if not literally) "catastrophic." The systems were used by all pay grades. The WPS found good usage by chiefs and officers who were required to draft messages, instructions, notices, watchbills, and general internal correspondence. The DMS applications in COONTZ were particularly suited to meeting a large variety of shipboard local-unique functions or those general informal reports and correspondence that must be generated by the ship's various work units on a periodic basis. Both the DMS and WPS were generally easy to use, as evidenced by the number of non-ADP-trained or inexperienced personnel on both ships who used the computers' capabilities. New users were interacting with the system after only a few hours of hands-on indoctrination. Ease-of-use was facilitated by help statements and prompts and by selection of DMS/WPS applications that had high/frequent usage in a manual state before they were automated.

System Security and Privacy

System security, as mentioned above, generally involved limiting the data files and functions available to each user by assigning "user areas" (computer accounts), each with its own PPN and password. This form of area or cell security was sufficient for the WPS

and operating system functions but suffered when using a DMS, as in COONTZ. Since a DMS must meet the needs of several levels of management and cross organizational unit boundaries, DMS users in COONTZ had to be grouped in a small number of DMS function-oriented user areas (e.g., maintenance). Consequently, some DMS users had access to and, if inclined, could have tampered with the data files of other DMS users in the same account. This mechanism of pooling DMS users weakened system security somewhat but did make the DMS in COONTZ usable and more responsive. (There were no reports that data were ever intentionally or accidently corrupted or lost by a DMS user.)

System security was complemented by the ship's own physical security systems. Video display terminals were always located in manned or locked spaces. Armed watch personnel, who guarded the ship against access by unauthorized personnel and damage by fire or flooding, precluded any noncrew member from gaining access to the micro-computer hardware and software. Also, there was no off-ship telecommunication capability by which an individual could access the system files by a remote telephone data system.

Akin to system security was privacy of personnel data, such as pay and medical data. System privacy was maintained by use of PPN user accounts and passwords (single and double) and ship-tailored input routines. The latter not only facilitated ease of data entry but also restricted a user "view" or updating accessibility to a need-to-know subset of data elements from the DMS personnel data files.

System Responsiveness

System responsiveness of the microprocessor and its applications was adequate and did not disrupt user productivity. Response delays for system log-ins, operating system commands and queries, and DMS/WPS data entry were negligible (.3 to 4 seconds). Wait time for most DMS/WPS and operating system outputs ranged between 4 seconds for a simple word processing text to 5 minutes for a single file data management report. In some instances, however, up to 30 minutes would elapse, as in the case of a large multifile, multikey DMS report (e.g., master personnel roster), before printing would actually commence after a print request had been initiated by a user. These delays, although considered long by users of minicomputers or large mainframe computers, were not perceived to be detrimental to the shipboard users. When response delays were predictable by the user (e.g., when he was aware of system loading fluctuations or knew the report being processed was complex), the system was still considered "responsive" to that user because the microcomputer could produce an output faster and neater than if he had prepared it by typewriter.

System Data Storage Capacity

On-line disk data storage of ten million bytes (10MB) was adequate for initial uses of the microcomputer systems aboard COONTZ and RADFORD. In COONTZ, however, the DMS/WPS data storage requirements soon outgrew the allotted on-line 10MB. Since 5MB of on-line data was stored on a removable disk pack, lower priority data files, such as WPS files for ship's notices and instructions, had to be stored off-line on extra 5MB disk packs until needed by a system user. When off-line stored data were requested, the system manager had to secure the system and "mount" the extra disk for the requesting user(s). This, in turn, denied other system users access to data files on the original disk pack. Thus, timesharing of disk packs became a system management routine for accessing all the DMS/WPS data in COONTZ. In RADFORD, on the other hand, sufficent space remained on the two on-line disks to accommodate their WPS applications.

System Flexibility and Adaptability

Since the microcomputer system DMS/WPS software itself promoted an evolutionary growth of data management subsystems and word processing text libraries, system flexibility and system adaptability were essentially "built-in" and depended solely upon the need for change or new applications by the users and upon the expertise of the onboard system designer-developers. Since individual WPS users were primarily their own designers and developers, they had both the autonomy and the flexibility to shape their respective WPS libraries to meet their particular needs. The DMS in COONTZ, however, depended more on a functional group-oriented design and development effort. The CO of COONTZ took the role of the initial DMS system analyst and DMS applications development engineer. The users of a new application provided system feedback for improvement or ideas for new DMS applications.

User Acceptability

User acceptability of the microcomputer system was good. General user awareness of DMS/WPS functionality, coupled with demonstrated knowledge that the system could perform immediately on the job, contributed directly to system user acceptability. For some users, the fact that they were allowed to request and receive modifications and/or new applications or be involved directly in the design of an application was sufficient to gain their complete acceptance of automating a previously manual operation. Similarly, when a newly reported DMS user was allowed to invoke his own desired changes into an existing application (e.g., add a new data element to a report), the system became more "acceptable" to that user.

Also, it was noted that computer games were an effective means of familiarizing a new user with the microcomputer and dispelling any fears he may have about computers.

System Transportability

The microcomputer system hardware, as previously mentioned, could be disassembled and carried by one or two personnel to any other ship location or into another ship without difficulty. Since no special "militarization" of system components was necessary prior to installation, system reinstallation could be accomplished in less than 5 working days with ship's company personnel assisting by securing the hardware and laying cables for the peripheral devices.

System software would be directly transferrable to a new system hardware location. Translation of the system software for use on another manufacturer's computer hardware appears impractical due to the many nonstandard and vender-unique features of the Alpha Micro and AMS software. However, for a computer containing a comparable DMS and WPS, a near duplicate set of DMS/WPS applications could be created in a reasonable time (1 to 3 months) with vendor and user support.

System Personnel and Logistic Support

The microcomputer systems in COONTZ and RADFORD were operated and managed by a data systems technician (DSC in COONTZ; DS2 in RADFORD). Since COONTZ had created a larger integrated DMS involving a larger percentage of the crew than had RADFORD, the DSC in COONTZ spent about 45 percent of his assigned duties as the DMS system manager. The system manager-operator carried out the following tasks:

1. Performed troubleshooting for both hardware and software.

10

2.   Performed system analysis and DMS-level application programming.

3.   Operated all microcomputer equipment, created and debugged new DMS applications, and detected and corrected program errors.

4.   Performed disk-to-disk backup of system data files and programs. Managed storage and on-line time of the system disk packs.

5.   Trained new system users.

6.   Maintained on-hand ADP supplies, such as computer paper, printer ribbons, and report binders.

Both COONTZ and RADFORD provided data-entry terminal operators from the department, division, or work center using and maintaining a data file or word processing application. These operators, from all pay grades, could type and usually had a direct responsibility for the data or words maintained for them by the microcomputer. It required 1 to 2 hours of system indoctrination to teach a new user to properly log-on to the microcomputer and to start entering data or words for his particular application. The SOROC IQ-120 video display terminals were used by all users as input devices to the computer with output on either the DECwriter III LA-120 or the Qume printer-typewriter.

The microcomputer system was supportable and self-sufficent in the shipboard environment. As previously mentioned, ship's force was tasked to operate and maintain the microcomputer system. The ship's Type Commander, however, was always available for additional support, if required.

System Benefits

Aboard both COONTZ and RADFORD, the DMS/WPS applications were designed and developed by ship's company personnel using a microcomputer-based DMS and WPS to meet each ship's unique recordkeeping and reporting requirements for selected shipboard administrative functions. The benefits derived from these DMS/WPS applications are discussed in the following subparagraphs.

Shipboard Operations

The most significant overall benefit that resulted from the ship-initiated microcomputer applications in COONTZ and RADFORD was in general shipboard operations. Specifically, this resulted from the capability of the DMS/WPS to (1) facilitate the accessibility of information for better planning and decision making, (2) increase the quality of the ship's administrative functions by reducing errors and improving typing clarity, and (3) reduce the manual administrative workload, providing shipboard managers greater opportunities to manage. These beneficial attributes are illustrated below for the three DMS application subsystems in COONTZ shown in Figure 1.

1.   Administration

a.   General.

(1) Assisted in ship's office operations with tickler information on prospective gains and losses, good conduct awards due, deliquent general damage control (GDC) PQS qualifications, birthdays, time-in-rate (for next advancement), and general counts of on-board rates and ratings.

(2) Facilitated the accurate accounting of assigned personnel with computer-generated personnel rosters and muster reports.

(3) Assisted the administration of personnel work assignments and workload planning by promulgating duty status information on individuals scheduled for temporary additional duty (TAD), schools, leave, or transfer.

(4) Enhanced inport watch wake-up and locator efficiency by listing onboard personnel and their compartment bunk assignments.

(5) Facilitated the promulgation of the ship's command policies and directives by systematizing the revision and reprinting of ship's notices and instructions.

(6) Supported the Navy's enlisted retention programs by providing the career counselor with computerized aids to track career interviews and potential reenlistments.

(7) Enhanced the ship's public affairs program by producing mailing address labels for multiple types of general public and dependent mailings.

(8) Assisted in the awareness of the operation department's combat readiness by keeping and promulgating availability of departmental equipment.

(9) Assisted in the proper dissemination of naval messages by maintaining an accurate communications routing guide for radio central personnel.

(10) Facilitated internal communications by maintaining and listing the ship's service telephone directory.

(11) Facilitated the retrieval of weapon's operating and maintenance information by maintaining accurate listings of weapon publication inventories, locations, and changes entered.

(12) Supported combat readiness by facilitating missile inventory management and monitoring of missile maintenance due dates.

b. Job/duty/watch assignment.

(1) Contributed to watchstation and combat readiness by facilitating the management of General Quarters and Condition III billet-job watchstation assignment data.

(2) Supported shipboard physical security by facilitating the preparation of in-port duty section watchbill assignments and distribution of qualified personnel in each duty section.

(3) Contributed to personnel safety at sea by producing accurate liferaft lists and muster sheets.

(4) Enhanced inport emergency readiness by producing accurate personnel recall information.

c. Planning/training. Supported training readiness by providing exercise, inspection, and general event history records, weekly training planners, and schedules.

d. School.

(1) Facilitated the deficit reduction of required on-board school graduates by maintaining and reporting data on required schools versus on-board graduates for each school.

(2) Facilitated the reduction of school quota no-shows by disseminating information on filled and vacant quotas.

(3) Facilitated the TAD processing of prospective school candidates by promulgating timely notice of school quotas, convening dates, and designated attendees.

e. Physical security.

(1) Contributed to shipboard nuclear weapons security by producing accurate and up-to-date personnel reliability program (PRP) personnel assignment and controlled/limited access lists.

(2) Enhanced quarterdeck access by promulgating accurate visitor clearance lists. (These computerized lists greatly reduced the delay time previously required to page through hundreds of loose-leaf visit request forms and messages).

f. Medical.

(1) Systematized and facilitated general preventive medical scheduling by maintaining and listing status on annual physical examinations, dental examinations, audiograms, and immunization shots.

(2) Supported medical treatment readiness by providing quick and accurate inventory accounting of authorized medical allowance list (AMAL) supplies and on-board personnel sources of various types of blood.

g. Enlisted dining facility. Facilitated enlisted dining preparation efficiency by providing menu planning and food preparation aids.

2. Maintenance

a. Zone inspection.

(1) Enhanced awareness of the ship's material condition by the quick dissemination of updated material zone inspection results.

(2) Facilitated correction of zone inspection discrepancies by promulgating inspection results to responsible work centers in work center compartment order.

b. Equipment discrepancy/corrective maintenance. Enhanced awareness of combat readiness by facilitating the logging and corrective maintenance monitoring of work center equipment discrepancies and by supporting the Navy's casualty reporting system.

c. Supply. Enhanced supply support responsiveness by facilitating the processing, budgetary control, and monitoring of outstanding supply requisitions.

3. Personnel Qualifications—PQS. Assisted personnel qualifications management by (a) establishing standards for PQS training "tracks" for each work center, (b) centralizing

command monitoring of personnel qualifications, and (c) automating work center PQS progress charting.

Clerical Efficiency and Productivity

Complementing the contributions of the DMS/WPS to shipboard operations was the system's contribution to increased clerical efficiency and productivity. There was no typing backlog evident in COONTZ. Even long-term, nice-to-have, typing chores, such as redoing the Ship's Organization and Regulations Manual, were done in COONTZ. In fact, yeomen (YN) personnel were freed to assist with departmental typing and administration that, heretofore, had been left to inexperienced seamen and firemen drawn from the departmental ranks. A target turnaround time for any routine typing chore in COONTZ was 24 hours. While the author was on board COONTZ, an emergency request to type a new and large damage-control-oriented ship's instruction was made upon the ship's office. The typing task was done by close of business the same day using the system's word processing capability. Also, since the WPS was available for non-YN personnel, would-be typing chores were often undertaken by these individuals. This not only allowed them to get their typing done quicker and to their own specifications without interacting with the YN typing pool but also eased the workload on the ship's office.

Similarly, other ship's managers (e.g., duty section watch coordinators, storekeepers, work center supervisors, and training managers) experienced the same "catching-up" phenomenon using the DMS and felt that their management skills were better exercised. This may have occurred because (1) their data were "in order" (up-to-date, accurate, and neatly formatted) and (2) they had more time to reflect on those data for planning and decision purposes rather than spending their time collecting and presenting it to others. Their productivity as ship's managers was, consequently, enhanced. Another example supporting this productivity attribute of the DMS was seen when the department heads inputted planning data into the planning board for training (PBFT) planner, which was subsequently used as a planning aid for the forthcoming week's schedule of events. The DMS seemed to "impose" upon the department heads the need to (1) submit their training requirements and event dates-times and (2) resolve problems/differences with other departments' plans before the PBFT meeting. This premeeting activity saved time and avoided much interdepartmental argument in the presence of the executive officer (XO), who presided as the PBFT chairman.

Management Control and User Interdependency

The more sophisticated DMS application subsystems in COONTZ depended upon multiple data input routines. Reports from these applications were, in turn, widely distributed (e.g., intermediate maintenance activity (IMA) work status reports) and/or were used by a few key shipboard managers for planning and decision purposes (PBFT Planner). This input-output interrelationship of a previously manual information operation resulted, when automated, into more visible and comprehensible functional interdependency between data entry operators and DMS report users. This user interdependency added a synergistic quality to the multi-user DMS applications and promoted a total team effort in COONTZ that may not have been present in the pre-DMS situation.

Not only did some DMS applications in COONTZ tend to unite system users into a more functional team by the imposed information structure of the DMS application itself, but also the outputs themselves effected a self-correcting quality control phenomena. For example, personnel with missing liferaft assignment data always appeared at the top of the Liferaft Listing report. Since the DMS could quickly correct and reprint a corrected report, it became a simple act, if not a compulsive one, for the first lieutenant

(as in this case) to do so. Another phenomenon that promoted DMS quality control was when ship's managers displayed a direct interest in the DMS outputs. Aboard COONTZ, the CO received, at the beginning of each week, a bounded subset of DMS reports for his perusal. This act of interest and the very presence of these reports in the CO's cabin encouraged accuracy and completeness of their contents.

Corporate Memory

In many instances, aboard both COONTZ and RADFORD, the data management and word processing efforts of relieved or transferred individuals were easily passed on to relieving personnel, hence preserving and perpetuating the corporate memory of the data that was generated and successfully used by others in the past. The computer-based endeavors of one personnelman first class (PN1) aboard COONTZ were inherited, learned, and improved upon by a relieving PN1 to keep and enhance the corporate memory and capabilities of the ship's administrative office. Similarly, the microcomputer system facilitated the ease and quickness of the turnover of department head responsibilities by a newly reported weapons officer. RADFORD, when relieved of deployment duties by another ship, was likewise able to turn over quickly computer-generated standard operating procedures (SOP) documents and messages to the relieving U.S. Navy ship for its immediate use, thus preserving the corporate memory of inter-Navy procedures, lessons learned, and communication formats.

Computer Literacy

Many crew members aboard both COONTZ and RADFORD were exposed for the first time to an interactive, state-of-the-art computer system and obtained hands-on experience on the operation and cababilities of a computer-based DMS (COONTZ) and WPS (COONTZ and RADFORD). This involvement afforded the crews of both ships a degree of computer literacy heretofore not experienced by shipboard personnel. Each crew was able to gain first-hand insight and appreciation of the advantanges and disadvantages of a shipboard ADP system that will aid them in future use of other systems, both ashore and afloat.

Job Satisfaction

Several individuals aboard both COONTZ and RADFORD indicated that their jobs had been enriched because of the microcomputer. The two system managers and their assigned (or volunteer) helpers enjoyed their work, although it usually entailed extra hours to perform both their regularly assigned duties and work associated with the microcomputer. To them, the microcomputer system was an avocation that elevated their status aboard ship as the "system experts." Others who used the microcomputer to generate reports or documents delighted in the positive feedback they received from supervisers, subordinates, and peers in the promptness, accuracy, and neatness of their computer-generated outputs (e.g., watchbills, internal memorandums, rosters, etc.). Generally, the microcomputer was perceived as contributing to shipboard administration and increased job satisfaction for those who benefited from its use.

System Costs

Fiscal Costs

The microcomputer system hardware, software, maintenance, and support personnel cost approximately $50,000 for each ship. A detailed cost breakdown is presented in Table 1. ADP consumables (paper and ribbon) cost about $134 aboard COONTZ and $70

Table 1

COONTZ DMS Cost Data

Item	Cost
Hardware:	
Central Processing Unit (AM-1301)	$30,650
w/256 KB MOS Memory	
10 MB CDC Disk Drive	
12 I/O Ports	
Hash Filter and Rack	
SOROC 120 CRT Terminals (6)	5,600
QUME Printer	3,000
DECwriter III LA-120 Printer	2,500
Cabling/connectors	500
Installation	NC
Subtotal	42,250
Software:	
AMS Data Management System	4,000
ALPHAWORD Word Processing	1,000
AMOS and AlphaBASIC	NC
Subtotal	5,000
Maintenance:	
Spare parts kits	2,800
Training	1,000
Subtotal	3,800
Total	$51,050

Note. There were no personnel costs.

for RADFORD per month. No monthly costs were incurred for spare parts because the systems never failed. No costs were recorded for personnel since no new billets were assigned to either ship to support the microcomputer system. Commander Naval Surface Force, U.S. Atlantic Fleet (COMNAVSURFLANT) leased the two microcomputer systems for about $10,000 per year. Adding annual operating costs of $1,200 for ADP consumables and $1,000 contingency for repairs (not needed in 1981), a total annual cost of $12,200 was required to lease and operate the microcomputer in each ship.

System Manning and Personnel Training

The cost to man and operate the microcomputer system and the ship-initiated applications in COONTZ and RADFORD was more one of reallocated man-hours than any fiscal outlay of money. A conservative estimate of 8000 man-hours per year was expended in COONTZ for shipboard personnel to attend to the needs of the micro-computer hardware, software, DMS, and WPS (7000 man-hours for data input-output assuming an average of four CRT terminals on-line per 8-hour day; 1000 man-hours for system management and operating tasks and user training assuming an average of 45% time spent in system support by the assigned system manager).

Except for the man-hours expended by the system manager, it is estimated that the man-hours reallocated by the DMS/WPS users to use the computer to help them perform their job was equal to or less than those that would have been required if they had continued to carry out those same assigned duties manually. Thus, the residual cost to man the microcomputer system and train user personnel was the man-hours spent by the assigned system manager. Aboard COONTZ, the system manager (DSC) had excellent subordinate assistance to help him to supervise and manage his work center personnel and ship's work. This gave the DSC the time to perform the tasks associated with being a microcomputer system manager. On RADFORD, on the other hand, the system manager (DS2) was heavily committed to perform work center maintanence tasks at the expense of his system manager functions. This could account, in part, for the fewer system backups and limited DMS applications in RADFORD.

Application Development and Documentation

No off-ship Navy or contractural system analysis and programming support was provided to either COONTZ and RADFORD for DMS/WPS design, development, imple-mentation, and documentation. This effort was accomplished solely by interested and contributing ship's company personnel and required hundreds of man-hours. The principal contributor to the design, development, and implementation of the DMS in COONTZ was the ship's CO, who because of his unique skills and dedication, was able to simultaneously command his ship and construct a viable DMS system. This effort was atypical. Fortunately, such a feat needed only to be accomplished once for COONTZ and, perhaps, not at all for other ships with an identical microcomputer and similar DMS requirements.

LESSONS LEARNED

Since the introduction of integrated circuits in the mid-1960s, the size and cost of computers has diminished. A like, but opposite, increase in the procurement of computers for commerical, military, and personal use followed. In 1975, the Navy established the Chief of Naval Operations-sponsored Shipboard Nontactical ADP Program (SNAP) as an effort to provide computers to all combatant ships for a variety of nontactical ADP administrative functions. This program is ongoing and installation of such computers into fleet units will commence in late 1982. Similarly, inexpensive and versatile microcom-puter systems, outside the purview of SNAP, are beginning to appear in ships to satisfy various ship-internal administrative requirements that were either deferred or not envisioned by SNAP.

The microcomputer systems installed in COONTZ and RADFORD represent one of the first and largest ship-initiated endeavors not under the auspices of SNAP to utilize

microprocessor technology afloat for nontactical ADP functions. Lessons learned from this undertaking are summarized below:

1. A microcomputer system with a data management and word processing capability can have a major impact on reducing shipboard administrative burden and, in turn, can contribute to day-to-day ship operating efficiency.

2. A microcomputer-based DMS and WPS can efficiently and effectively allow ship's company personnel to generate and use shipboard local-unique computer applications without the aid of professional programmers.

3. Typing productivity aboard ship can be increased dramatically by a multi-terminal, multi-user distributed word processing cabability. Such a capability can facilitate the drafting, storage, and editing of naval messages and can preclude shipboard ADP requirements to program preformatted messages for interactive generation.

4. A commercially acquired microcompouter system using rotating disk storage ADPE can operate reliably without special ruggedization in the at-sea shipboard environment.

5. A microcomputer system can be installed, operated, and managed by ship's force personnel. An individual, trained and available (30%-50% of assigned duties), should be appointed to operate and manage a shipboard microcomputer system.

6. A microcomputer system can be affordable for shipboard use on an annual lease basis ($10,000 per year).

7. Ten megabytes of on-line mass disk storage was insufficient to support the local-unique ADP requirements aboard ship.

8. One medium-speed printer and one slow-speed letter-quality printer were sufficient to print local-unique ADP hard-copy outputs aboard ship.

9. Printers with compressed-print capability for 220-column report generation can be useful for displaying multiple data element files.

10. Six video display terminals were insufficient to support data entry during peak user periods aboard ship.

11. Disk-to-disk backup of disk media stored data can be faster and as reliable as disk-to-tape backups.

12. Microcomputer hardware and software documentation, together with software embedded application menus and help statements, are necessary to minimize the impact of initial system implementation and user indoctrination.

13. Microcomputer user acceptance can be facilitated by promoting user computer involvement with a user-relevent application and by using computer games.

14. Minor microcomputer system response delays do not discourage system usage if the user understands the nature and cause of the delays.

15. Use of screen-formatted input routines can simplify and reduce data entry time.

16. Command word (vice menu) entry can facilitate application program access for experienced users.

17. Logical data file keys (personnel last name, equipment nickname, compartment name, etc.) are a more desirable means to retrieve data records than traditional alphanumeric keys (social security number, job sequence number, federal stock number, etc.).

18. WPSs with a limited sort of listing capability can provide a simple shipboard data management function.

19. Microcomputer system data security using project-programmer number and password can be adequate for single-user word processing applications but may not be sufficient for multiple-user data management applications.

20. A microcomputer system can promote synergistic team support for some multiple-user dependent data management applications, perpetuate shipboard corporate memory, and contribute to user job satisfaction.

CONCLUSIONS

The use of a microcomputer system with a data management and word processing capability for automating selected ship-internal administrative functions appeared to have increased clerical productivity and operating efficiency in both COONTZ and RADFORD. The introduction of a comparable capability in other ships, either through SNAP or by other ship-initiated means, would likely produce similar benefits.

RECOMMENDATIONS

1. Encourage and fund micro- or minicomputer ship-initiated endeavors in order to improve shipboard administrative efficiency and combat readiness and to provide useful feedback to related shipboard nontactical ADP research and development programs.

2. Incorporate user-designed and command-managed DMS software packages into the software configuration for future shipboard nontactical ADP or WPS implementation programs to support local-unique computer-based applications.

3. Design shipboard WPSs to support multiple WPS terminals for use by any user required to draft or produce typed and formatted documents.

APPENDIX

DMS AND WPS APPLICATIONS

COONTZ DATA MANAGEMENT SYSTEM APPLICATIONS

Data Files:

Authorized medical allowance list
(AMAL) inventory file
AMAL issues file
AMAL transaction file
Budget allocations file
Career counselor data file
CIC pass-down-the-line file
Clearance list file
Communications routing guide file
Compartment master listing
Condition III job-by-billet file
Crew members file
Crew recall file
Current PQS program file
Department document NR control file
Duty section job file
   3-section duty file
   4-section duty file
   5-section duty file
Enlisted dining facility
(EDF) cycle menu file
Exercise communications file
General quarters (GQ) job by billet file
Job sequence numbers control file
Leave requests file
Liferaft assignment file
Mailing list file
Medical tickler file

Missile inventory file
Notices/instructions revision (5215) file
Navy tactical data system (NTDS) circuit
  cards file
Operation's equipment status file
Pending 1250 requisition file
Personnel reliability program file
Phone directory file
PQS history file
PQS standards file
PQS track file
Recipe cards file
Requisition status history file
Schedule of events file
School quota request file
School requirements file
Schools attended file
Standard menus file
Supply status codes file
Supply status file
1250 requisitions master file
Tab schedule file
Tread status file
publications inventory file
Work center equipment deficiency list
  (EDL) file
Zone inspections controls file
Zone inspections file

Input Routines (ship-generated):

Annual physical exam date
Audiogram date maintenance
Blood type maintenance
Career prospects
Casualty correction (CASCOR) maintenance
Casualty report (CASREPT) maintenance
Clearance maintenance
Cycle menu maintenance
Date of rate maintenance
DC PQS status maintenance
Dental data maintenance
Duty status maintenance
EDF maintenance
EDF menu input
IMA estimated time to repair (ETR) changes
IMA work package maintenance
Leave date input
Leave status
Liferaft assignment maintenance
Mailing list maintenance
Mailing list purge
Medical data imput

New man entry
New requisition document input
New 1250 requisition
Personnel reliability program (PRP)
  data maintenance
Qualifications maintenance
  3-section duty maintenance
  4-section duty maintenance
  5-section duty maintenance
Rack number
Rate maintenance
Recall telephone number
School quota entry
School quota maintenance
Schools attended
Schools requirement input
Situation report (SITREP) maintenance
Storekeeper 1250 maintenance
Supply status
Tab schedule update
Tread schedule update
X-ray date maintenance
Zone inspection results
40Mart input

Output Reports:

AMAL inventory report
AMAL resupply requirements
Billet number list
Birthday list
Career counselor data report
Career counselor interview report
Career sea pay verification
CASREPT summary
Communication routing guide
Delinquent DC PQS status
Dental class statistics
Department budget report
Duty section assignments
Duty section watchbill
Eight o'clock reports
Food preparation worksheets
Good conduct tickler
IMA work status
IMA work status by job sequence number
IMA work status by priority
IMA work status by work center
Leave date listing
Leave personnel by date
Liferaft assignments
Liferaft muster lists
Mailing list verification
Mandatory turn-in listing
Master personnel roster
Medical data report
Medical tickler report
Missile inventory report
Missile maintenance due
Muster report
Notice/instruction revision status
NTDS logic cards
Operation's department equipment status
Overdue issue listing
Personnel statistics computations
Personnel statistics report
Planning board for training planner
Prospective gains list

PRP access lists
PRP ALPHA listing
PRP FZ lists
PRP personnel listing
PRP safe access lists
PQS in progress report
Rack list by work center
Recall bill
Required school listing
Requisition poor status report
Retention interview management report
Schedule of events
School dates by catolog of training courses
   (CANTRAC) number
School quotas
School requirement planner
Schools attended by work center
Schools attended listing
Security clearance lists
Ship's budget report
Storekeeper 1250 activity report
Supply requisition status
1250 requisition review
Telephone listing
Time-in-rate-check
Tread status projection
Underway exercises schedule
Universal calender
Unprocessed 1250 report
Wardroom meal signup list
Weapon's department publications inventory
Weekly EDF menu
Work center budget report
Work center consumption report
Work center equipment discrepancy listing
Work center leave listing
Work center muster lists
Work center personnel listing
Work center requisition status
Work center zone discrepancy listing
Zone inspection compartment listing
Zone inspection discrepancy listing

RADFORD WORD PROCESSING SYSTEM APPLICATIONS

Data Files:

Air detachment check-lists, reports, and messages	Performance evaluation remarks
Berthing assignments*	Personnel/material inspection results
Budget reports*	Personnel reliability program administration*
CASREPT requisition status*	Personnel roster and muster reports*
Divisional DCPO assignments	Plan-of-the-day notes
Duty section assignments watches*	PQS standards cards
Eight o'clock reports*	Publications inventories*
External correspondence	Qualifications tests-answers
Federal stock number (FSN) directories	Report and action tickler files
Inspection check-off sheets	School lists and convening dates*
Internal correspondence	School-of-the-ship study guides
Lesson plans	Ship's general and emergency bills
Liferaft assignments*	Small arms inventory control
Master-at-arms administration	Standard operating procedures
Mess cooking administration	Training schedules*
Naval message drafting	Universal calendars*
Notices/instructions	Visitor clearance lists*

*These are similar to COONTZ DMS applications.

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